

**What is claimed is:**

1. A communication control apparatus of a CDMA base station system, comprising:

5 a control section which generates a first transmission start signal to instruct start of software hand-over for a mobile station which is communicating; and

a transmission signal processing section which determines a current time period from at least  
10 one previous time period in response to said first transmission start signal, and generates a second transmission start signal after the determined current time period from reception of said first transmission start signal, said at least one previous time period  
15 being measured in said transmission signal processing section,

wherein a transmission signal is transmitted from said communication control apparatus to said communicating mobile station in response to said  
20 second transmission start signal.

2. The communication control apparatus according to claim 1, wherein said transmission signal processing section further comprises a memory area,  
25 said transmission signal processing section determines said current time period from said at least one previous time period stored in said memory area.

3.           The communication control apparatus according to claim 2, wherein said transmission signal processing section receives a reply signal to said transmission signal as a synchronization establishment  
5 signal from said communicating mobile station, determines a time period from the generation of said second transmission start signal to the reception of said synchronization establishment signal and stores the determined time period as said previous time  
10 period in said memory area.

4.           The communication control apparatus according to claim 2, wherein said memory area is provided for every mobile station.

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5.           The communication control apparatus according to claim 2, wherein said memory area is cleared if said memory area is not accessed for a predetermined time.

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6.           The communication control apparatus according to claim 5, wherein said memory area is allocated to another mobile station after said memory area is cleared.

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7.           The communication control apparatus according to claim 1, wherein said communication control

apparatus is provided for a plurality of sectors,

said software hand-over is carried out  
between first and second sectors of said plurality of  
sectors, and

5           said communicating mobile phone is  
communicating in said first sector.

8.           The communication control apparatus according  
to claim 1, wherein there are a plurality of previous  
10 time periods, and

said transmission signal processing section  
determines said current time period from an addition  
of all of said plurality of previous time periods.

15 9.           The communication control apparatus according  
to claim 1, wherein said transmission signal  
processing section determines said current time period  
from said previous time period immediately before.

20 10.           The communication control apparatus according  
to claim 1, wherein said transmission signal  
processing section comprises:

a memory area which is provided for said  
mobile station to store said at least one previous  
25 time period;

a transmission control signal generating  
section which reads out said at least one previous

time period from the memory area to determine said current time period; and

a timing generating section which contains a first counter and outputs said second transmission start signal when a counter value of said first counter and said current time period are coincident with each other, and

said transmission control signal generating section receives said second transmission start signal from said timing generating section and outputs said second transmission start signal.

11. The communication control apparatus according to claim 1, wherein the transmission signal processing section comprises:

a memory area which is provided for said mobile station to store said at least one previous time period;

a transmission control signal generating section which reads out said at least one previous time period from the memory area in response to said first transmission start signal to determine said current time period;

a timing generating section which contains a first counter and outputs said second transmission start signal when a counter value of said first counter and said current time period are coincident

with each other;

a transmission timing counter which contains a second counter and latches a second counter value of said second counter in response to said second

5 transmission start signal;

a synchronization timing counter which contains a third counter and latches a third counter value of said third counter in response to a reply signal to said transmission signal as a

10 synchronization establishment signal from said mobile station; and

a timing measuring section which reads said second counter value from said transmission timing counter and reads said third counter value from said synchronization timing counter in response to said synchronization establishment signal, and calculates a difference between said second counter value and said third counter value as a time period, and

said transmission control signal generating  
20 section which receives and transfer said second transmission start signal from said timing generating section and stores the calculated time period as said previous time period in said memory area.

25 12. The communication control apparatus according to claim 1, wherein the transmission signal processing section comprises:

a memory area which is provided for said mobile station to store said at least one previous time period;

a transmission control signal generating  
5 section which reads out said at least one previous time period from the memory area in response to said first transmission start signal to determine said current time period;

a timing measuring section; and

10 a timing generating section which contains a first counter, and outputs said second transmission start signal and the count value of said first counter as a first transmission counter value to said timing measuring section, when a counter value of said first  
15 counter and said current time period are coincident with each other, and outputs the count value of said first counter as a synchronization first counter value to said timing measuring section in response to a reply signal to said transmission signal as a  
20 synchronization establishment signal from said mobile station,

said timing measuring section calculates a time period as a difference between the first transmission counter value and the synchronization  
25 first counter value in response to said synchronization establishment signal, and

said transmission control signal generating

section receives and transfers said second transmission start signal from said timing generating section, and stores the calculated time period as said previous time period in said memory area.

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13. The communication control apparatus according to claim 11, wherein said transmission signal processing section further comprises:

a timing comparing section which outputs the  
10 calculated time period to said transmission control signal generating section when said calculated time period outputted from said timing measuring section is equal to or less than a reference value set previously.

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14. The communication control apparatus according to claim 12, wherein said transmission signal processing section further comprises:

a timing comparing section which outputs the  
20 calculated time period to said transmission control signal generating section when said calculated time period outputted from said timing measuring section is equal to or less than a reference value set previously.

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15. A CDMA base station system, comprising:  
a control section which generates a first

transmission start signal to instruct start of software hand-over for a mobile station which is communicating;

a transmission signal processing section  
5 which determines a current time period from at least one previous time period in response to said first transmission start signal, and generates a second transmission start signal after the determined current time period from reception of said first transmission  
10 start signal, said at least one previous time period being measured in said transmission signal processing section;

antennas which are provided to communicate with said communicating mobile station;

15 spreading sections, a selected one of which generates a spread signal obtained by carrying out a spreading process to a transmission base band signal in response to said second transmission start signal, said spread signal being transmitted to said  
20 communicating mobile state through one of said antennas corresponding to said selected spreading section; and

despreading sections, one of which corresponds to said selected spreading section and  
25 carries out synchronization detection of a reception signal from said communicating mobile station and generates a synchronization establishment signal.

16. The communication control apparatus according to claim 15, wherein said transmission signal processing section further comprises a memory area,

5 said transmission signal processing section determines said current time period from said at least one previous time period stored in said memory area.

17. The communication control apparatus according to claim 16, wherein said transmission signal

10 processing section receives a reply signal to said transmission signal as said synchronization establishment signal from said communicating mobile station, determines a time period from the generation of said second transmission start signal to the  
15 reception of said synchronization establishment signal and stores the determined time period as said previous time period in said memory area.

18. The communication control apparatus according to claim 15, wherein said transmission signal processing section comprises:

a memory area which is provided for said mobile station to store said at least one previous time period;

25 a transmission control signal generating section which reads out said at least one previous time period from the memory area to determine said

current time period; and

a timing generating section which contains a first counter and outputs said second transmission start signal when a counter value of said first  
5 counter and said current time period are coincident with each other, and

said transmission control signal generating section receives said second transmission start signal from said timing generating section and outputs said  
10 second transmission start signal.

19. The communication control apparatus according to claim 15, wherein the transmission signal processing section comprises:

15 a memory area which is provided for said mobile station to store said at least one previous time period;

a transmission control signal generating section which reads out said at least one previous  
20 time period from the memory area in response to said first transmission start signal to determine said current time period;

a timing generating section which contains a first counter and outputs said second transmission  
25 start signal when a counter value of said first counter and said current time period are coincident with each other;

a transmission timing counter which contains a second counter and latches a second counter value of said second counter in response to said second transmission start signal;

5           a synchronization timing counter which contains a third counter and latches a third counter value of said third counter in response to a reply signal to said transmission signal as a synchronization establishment signal from said mobile  
10 station; and

a timing measuring section which reads said second counter value from said transmission timing counter and reads said third counter value from said synchronization timing counter in response to said  
15 synchronization establishment signal, and calculates a difference between said second counter value and said third counter value as a time period, and

said transmission control signal generating section which receives and transfer said second  
20 transmission start signal from said timing generating section and stores the calculated time period as said previous time period in said memory area.

20.       The communication control apparatus according  
25 to claim 15, wherein the transmission signal processing section comprises:

a memory area which is provided for said

mobile station to store said at least one previous time period;

a transmission control signal generating section which reads out said at least one previous  
5 time period from the memory area in response to said first transmission start signal to determine said current time period;

a timing measuring section; and

a timing generating section which contains a  
10 first counter, and outputs said second transmission start signal and the count value of said first counter as a first transmission counter value to said timing measuring section, when a counter value of said first counter and said current time period are coincident  
15 with each other, and outputs the count value of said first counter as a synchronization first counter value to said timing measuring section in response to a reply signal to said transmission signal as a synchronization establishment signal from said mobile  
20 station,

said timing measuring section calculates a time period as a difference between the first transmission counter value and the synchronization first counter value in response to said  
25 synchronization establishment signal, and

said transmission control signal generating section receives and transfers said second

transmission start signal from said timing generating section, and stores the calculated time period as said previous time period in said memory area.

5 21. A communication control method in a CDMA base station system, comprising:

generating a first transmission start signal to instruct software hand-over between a first sector and a second sector different from the first sector in  
10 which a mobile station which is communicating;

generating a second transmission start signal with a current time period in response to said first transmission start signal; and

transmitting to said communicating mobile  
15 station, a spread signal which is obtained by carrying out a spreading process to a transmission base band signal in response to said second transmission start signal.

20 22. The communication control method according to claim 21, wherein said generating a second transmission start signal comprises:

reading out at least one transmission time value corresponding to said communicating mobile  
25 station from a memory area in response to said first transmission start signal;

determining said current time period from the

read out at least one transmission time value; and  
generating said second transmission start  
signal when a counter value of a first counter and the  
determined current time period are coincident with  
5 each other.

23. The communication control method according to  
claim 22, further comprising:

generating a synchronization establishment  
10 signal from a reception signal received from said  
communicating mobile station;

determining said transmission time value  
based on said synchronization establishment signal and  
said first transmission start signal; and  
15 storing the determined transmission time  
value in said memory area.

24. The communication control method according to  
claim 23, wherein said determining said transmission  
20 time value comprises:

holding a second counter value of a second  
counter in response to said second transmission start  
signal;

holding a third counter value of a third  
25 counter in response to said synchronization  
establishment signal; and

calculating said transmission time value from

said second counter value and said third counter value.

25.           The communication control method according to  
5 claim 23, wherein said storing the determined  
transmission time value comprises:

                  determining whether the determined  
transmission time value is larger than a reference  
value; and

10               storing the determined transmission time  
value in said memory area when the determined  
transmission time value is equal to or less than said  
reference value.